HeatRisk - Overview

The National Weather Service (NWS) experimental HeatRisk forecast provides a color and numeric value that places forecast heat for a specific location into an appropriate level of heat concern, along with identifying groups potentially most at risk at that level. The HeatRisk is accompanied by recommendations for heat protection and is a useful tool for planning for upcoming heat and its associated potential risk. Based on the high resolution NWS national gridded forecast database, a daily HeatRisk value is calculated for each location from the current date through seven days in the future. At this time, the experimental HeatRisk forecast is being used to influence the issuance of, and to add value, to the NWS's official heat watches, advisories, and warnings across much of the western United States in an experimental capacity. This product is another NWS tool that can be used to protect lives and property from the potential risk of excessive heat, being especially useful for those who are more easily affected by heat or those who provide support to those communities of heat vulnerable individuals. The experimental HeatRisk product ensures that communities have the right information at the right time to be better prepared for upcoming heat events. HeatRisk has been available in the Western United States since 2014 with plans to expand it nationally in 2023.

Who is most susceptible to heat?

Heat commonly affects certain groups, typically identified as heat sensitive or heat vulnerable, at lower thresholds than other populations. Some of these groups include:

- The elderly and the very young
- Those on certain medications and/or those with preexisting conditions which make them more sensitive to heat (your doctor can let you know if this is you)
- Those working outdoors -- especially new workers, temporary workers, or those returning to work after a week or more off
- Those exercising or doing strenuous activities outdoors during the heat of the day - especially those not used to the level of heat expected, those who are not drinking enough fluids, or those new to that type of activity
- Those without a reliable source of cooling and/or hydration - this includes otherwise healthy individuals who are attending outdoor festivals or activities who are exposed to the heat and may not recognize the early symptoms of heat stress
- Those not acclimated to the level of heat expected - especially those who are new to a much warmer climate
- Those sensitive to poor air quality, which can be exacerbated by heat waves
- Some economic sectors are also affected by increasing levels of heat, such as energy and transportation

Why is this different from the Heat Index, WetBulb Globe Temperature, or official NWS Heat Products?

The NWS has multiple tools to assess the potential for heat stress due to extreme temperatures. Each tool can inform the issuance of NWS official heat watches, warnings, and advisories. Each of these tools integrate various weather parameters to provide a deeper level of information beyond what the actual air

temperature can tell you. Because of that, each tool provides a different perspective and should be used appropriately to get the best understanding of the risk from an excessive heat event.

The biggest difference between the HeatRisk approach and other approaches is that the HeatRisk identifies unusual heat specifically for that particular date and location, rather than just using a single threshold value applied across a large area. This allows the approach to better account for acclimation and the variation in climatology that we know exists across most regions of the United States. To do this, we need to have a high resolution gridded climatology to put the forecast into context. HeatRisk also incorporates heat-health data from the CDC into the thresholds, essentially applying direct impact information into the approach.

While the heat index is a valuable component toward understanding heat risk for people, there are not an adequate number of stations across the country, particularly in the West, that report hourly humidity values for a long enough period of years to develop a high resolution gridded climatology. Additionally, in most approaches to heat index warning criteria, the impacts of excessively warm nights are not considered, nor the impacts from heat over the entire 24 hour period. The HeatRisk approach utilizes the many more observations of temperature that exist across the country, along with leveraging well known relationships between temperature and humidity to approximate the role of humidity. So, the HeatRisk approach does account for humidity, but in a more general sense, and its output will differ somewhat from specifically calculated heat index values.

The WetBulb Globe Temperature is another useful index that measures heat stress in direct sunlight, taking many factors into account. If you work or exercise in direct sunlight, this can be a good element to monitor. However, it is not a universal measure for heat risk, especially for the heat sensitive whose thresholds are much lower, for the homebound without effective cooling methods where the impacts of accumulated heat are important, and it can be quite challenging to accurately predict beyond the next day or two due to the many factors that need to be accounted for on the local scale. Gridded forecasts of WetBulb Globe Temperature forecasts are now available to support those specific users who work or exercise in direct exposure to the heat.

As mentioned earlier, the experimental HeatRisk is not an official NWS heat product. The NWS's heat watches, advisories, and warnings remain the official heat products from the NWS. The HeatRisk represents additional information that can be used to better identify those days of the year when heat may be at levels that pose a risk to certain populations or economic sectors. As we have discussed, for groups who are heat sensitive, their individual levels of action may be below NWS established heat criteria which are established to warn the entire general population to specific action. Additionally, while methodologies for specific heat criteria can be different from one NWS office to another, a goal of the experimental HeatRisk product is to explore applying a scientific and consistent methodology nationally to provide potential risk from upcoming heat in a uniform manner with output available for any level of heat, not just for the most extreme heat events.